

**CLAIMS**

I claim:

- 1           1.     A turbine vane, comprising:  
2               a generally elongated airfoil having a leading edge, a trailing edge, a first  
3               endwall at a first end, a second endwall at a second end generally opposite the first  
4               end, at least one cavity forming a cooling system in the vane, and at least one outer  
5               wall defining the at least one cavity forming at least a portion of the cooling system;  
6               wherein the cooling system comprises at least one vortex forming chamber in  
7               the outer wall of the vane that is located proximate to an intersection between the  
8               generally elongated airfoil and the first endwall for cooling the intersection between  
9               the generally elongated airfoil and the first endwall.
- 1           2.     The turbine vane of claim 1, wherein the at least one vortex forming  
2               chamber comprises at least one tube positioned around the perimeter of the  
3               generally elongated airfoil and proximate to the intersection between the generally  
4               elongated airfoil and the first endwall.
- 1           3.     The turbine vane of claim 2, wherein the at least one vortex forming  
2               chamber comprises at least one tube positioned around the perimeter of the  
3               generally elongated airfoil and proximate to the intersection between the generally  
4               elongated airfoil and the second endwall.
- 1           4.     The turbine vane of claim 2, wherein the at least one tube has a  
2               generally cylindrical cross-section.
- 1           5.     The turbine vane of claim 1, further comprising at least one cooling  
2               injection hole providing at least one cooling fluid supply pathway between the at least  
3               one cavity forming at least a portion of the cooling system and the at least one vortex  
4               forming chamber for enabling cooling fluids to enter the vortex forming chamber.

1           6.     The turbine vane of claim 5, wherein the at least one cooling injection  
2 hole directs cooling fluids into the vortex forming chamber in a direction offset from a  
3 longitudinal axis of the vortex forming chamber.

1           7.     The turbine vane of claim 6, wherein the at least one cooling injection  
2 hole comprises a plurality of cooling injection holes around a perimeter of the  
3 generally elongated airfoil.

1           8.     The turbine vane of claim 1, further comprising at least one film cooling  
2 hole extending from the at least one vortex forming chamber to an outer surface of  
3 the generally elongated airfoil.

1           9.     The turbine vane of claim 8, wherein an outlet of the at least one film  
2 cooling hole is positioned in the endwall proximate to the intersection between the  
3 generally elongated airfoil and the endwall.

1           10.    A turbine vane, comprising:  
2 a generally elongated airfoil having a leading edge, a trailing edge, a first  
3 endwall at a first end, a second endwall at a second end generally opposite the first  
4 end, and an internal cooling system formed from at least one cavity defined in part  
5 by at least one outer wall;  
6 wherein the cooling system comprises at least one tubular vortex forming  
7 chamber in the outer wall of the vane that is located proximate to a fillet positioned at  
8 an intersection between the generally elongated airfoil and the first endwall for  
9 cooling the intersection between the generally elongated airfoil and the first endwall.

1           11.    The turbine vane of claim 10, wherein the at least one vortex forming  
2 chamber comprises at least one tube positioned around the perimeter of the  
3 generally elongated airfoil and proximate to the fillet at the intersection between the  
4 generally elongated airfoil and the first endwall.

1           12.    The turbine vane of claim 11, wherein the at least one vortex forming  
2 chamber comprises at least one tube positioned around the perimeter of the  
3 generally elongated airfoil and proximate to the fillet at the intersection between the  
4 generally elongated airfoil and the second endwall.

1           13.    The turbine vane of claim 11, wherein the at least one tube has a  
2 generally cylindrical cross-section.

1           14.    The turbine vane of claim 10, further comprising at least one cooling  
2 injection hole providing at least one cooling fluid supply pathway between the at least  
3 one cavity forming at least a portion of the cooling system and the at least one vortex  
4 forming chamber for enabling cooling fluids to enter the vortex forming chamber.

1           15.    The turbine vane of claim 14, wherein the at least one cooling injection  
2 hole directs cooling fluids into the vortex forming chamber in a direction offset from a  
3 longitudinal axis of the vortex forming chamber.

1           16.    The turbine vane of claim 15, wherein the at least one cooling injection  
2 hole comprises a plurality of cooling injection holes around a perimeter of the  
3 generally elongated airfoil.

1           17.    The turbine vane of claim 10, further comprising at least one film  
2 cooling hole extending from the at least one vortex forming chamber to an outer  
3 surface of the generally elongated airfoil.

1           18.    The turbine vane of claim 17, wherein an outlet of the at least one film  
2 cooling hole is positioned in the endwall proximate to the fillet position at the  
3 intersection between the generally elongated airfoil and the endwall.